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ABSTRACT

Investigated was the ability of 18 blind and 18 partially sighted students in grades 4 through 12 to use the Aural Study System, which features unique indexing capabilities for searching recorded reference materials, to locate encyclopedia and dictionary items within practical time limits. Analyses were made of the time required to locate items, the accuracy with which items were located, and the accuracy of responses to questions about the items using both recorded and written (braille and large type) forms of the reference materials. Results indicated few differences of practical significance between Ss' efficient use of recorded references and of their braille and large type counterparts, leading to the conclusion that further development of the Aural Study System as a reference tool is justified. Other factors, such as lower cost and vast reduction of required storage space, strongly support developing recorded references. (LH)

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INTERIM PROGRESS REPORT

Project No. 23 3492

Grant No. OEG-0-73-0642

Program for Facilitating the Education of the Visually Handicapped through Research in Communications

No. 1 The American Printing House Aural Study System as a Reference Source

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Department of Health, Education, and Welfare

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The American Printing House Aural Study System as a Reference Source

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15 November 1974

The research reported herein was performed pursuant to a grant with the Bureau of Education for the Handicapped, U. S. Office of Education, Department of Health, Education, and Welfare. Contractors undertaking such projects under government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official position of the Bureau of Education for the Handicapped.

Department of Health, Education, and Welfare

U. S. Office of Education
Bureau of Education for the Handicapped

The purpose of this project was to explore the usefulness of the Aural Study System (Morris, Nolan, & Phelps, 1973) as a reference source. The system consists of a special record player, a unique record format, and ancillary written materials. It was built to specifications determined through analyses of the tasks involved in studying from recorded material. One of its most important features is an index capability which allows topics on a record to be found quickly and precisely.

The Aural Study System was initially developed as a source for textbooks. During its evaluation, its potential as a source for reference materials became apparent. At the same time, the need arose for a new or updated encyclopedia for use by the visually handicapped. This need gave impetus to evaluation of the Aural Study System as a source for such material.

The goal of the study was to determine if visually handicapped students could use recorded references successfully. Two references, an encyclopedia and a dictionary, were tested. The criteria of success were whether, after a brief familiarization experience, students could locate topics and accomplish educational tasks within practical time limits. To provide an ultimate standard, time for students to accomplish equivalent tasks with braille and large type materials were also determined. However, it was not expected that results of use of the recorded medium would equal those for braille or large type because of the very great differences in experience favoring use of the written medium.

Method

Design

Although the major interest was whether tasks could be accomplished within practical time limits, the experiment was designed so that the data could be analyzed through six mixed model analyses of variance. For both the dictionary and the encyclopedia, analyses were made of the time required to locate items, the accuracy with which items were located, and the accuracy of responses to questions about the items. In each analysis the within subject variable was medium (written vs. recorded) and the between subjects variables were reading type (braille vs. large type), grade level (4-6, 7-9, and 10-12), and order (A items written/B items recorded vs. A items recorded/B items written).

Subjects

Subjects were 36 legally blind students ranging in grades from 4-12. Four subjects were required at each grade level; two of whom read

braille and two of whom read large type. Potential subjects were selected randomly from those available at each grade level with alternates, in order of use, also being identified. All subjects were from regular classes and had IQs of 85 or higher. The majority of the subjects came from the Indiana School for the Blind at Indianapolis with the balance coming from the Cincinnati (Ohio) public schools and the Missouri School for the Blind at St. Louis. Potential subjects were screened to insure that only those who could demonstrate alphabetization skills be included. This was done by having each potential subject recite the alphabet and complete the Alphabetical Screening Task II, described in Appendix A. In order to qualify for inclusion, the alphabet had to be recited perfectly, self-corrections permitted, and a minimum of seven of the eight pairs of words on the alphabetical screening task had to be alphabetized correctly. (All potential subjects were able to perform adequately on both tasks.) Additionally, braille subjects must have used braille as their primary mode of reading for a minimum of one year and large type subjects had to be able to see well enough to use 12-point type. This latter was necessary as the written edition of the encyclopedia they used was produced in this size type. Only students who volunteered after being told what would be required of them were used as subjects.

No effort was made to control for IQ, age, or sex, nor was any attempt made to equate subjects coming from different types of school programs.

Materials

Record players. Four record players were required. Two were used by the two experimenters and the other two were backup machines. The players used were those developed in the Aural Study Systems for the Visually Handicapped project described by Morris, Nolan, and Phelps, (1973), and Morris, Nolan, and Brothers (1973). They were especially designed for use by the visually handicapped for aural study and contain a number of special features for this purpose. These features include two indexing capabilities--one for gross search and one for fine search, both a rapid forward and a rapid reverse capability, a pause mechanism featuring instantaneous stopping and starting, and a variable speed capability which, when used in conjunction with the turntable speed control (8-1/3, 16-2/3, and 33-1/3 rpm), makes possible a continuous range of turntable speeds from 4-1/6 rpm to 50 rpm.

To find a topic within a recorded book, the user first refers to a written key to learn the record, side, and the part within the side where the topic can be found. Then he selects the appropriate record; places it on the turntable with the desired side up; and, through use of the system's indexing capability, rapidly finds the desired place on the record. This is done by employing the system's two indexing mechanisms. The first, for finding a major part of the record, enables the user to place the stylus at the beginning of each part of the side by positioning

the tone arm directly over a narrow empty band preceding each recorded part. Then, through use of the second indexing mechanism, the record can be rapidly searched, either forward or backwards. During this rapid search, index cues such as page numbers or alphabetically arranged "guide words" are heard which enable the user to constantly monitor his search. When the closest index cue is heard, such as the page number of the page where the sought item will be found, the regular play mechanism is engaged and the content scanned until the exact place is found. This scanning can be done at any speed desired as long as it remains intelligible.

Recorded dictionary selection. A 120-minute recording from the Thorndike-Barnhart Junior Dictionary (Thorndike & Barnhart, 1959a), a dictionary designed for use by students in grades 4-6, was made in the Talking Book Studios of the American Printing House for the Blind (APH). The entire recording was contained on one side of a 12-inch disc.

The disc on which the recording was produced was especially made for use with the record player previously described. It was a stereophonic disc containing content information on one channel recorded at 8-1/3 rpm and index information on the other channel recorded at 66-2/3 rpm. Both channels were contained within the same groove but, when played on the special record player, were heard separately. The record was divided linearly into nine approximately equal parts separated by narrow, blank or empty (unrecorded) bands. Because of the nature of a disc, the amount of information contained within each part was not equal.

There were 308 items included on the content channel of which the first was the letter "a" and the last was the word "adolescent." Forty-five of the items (15%) were indexed items meaning they were indicated on the index channel (they were pronounced and their first few letters given). Items on the index channel were calibrated with like items on the content channel. All items on both channels were preceded by "beeps" used as attention getters. Each part of the record started with an indexed item. A listing of the indexed items occurring in each part of the record appears in Appendix B.

Prior to the recording of the dictionary selection, the text material was edited. This was done to make the content identical to that of the braille edition. The editing task included indicating which words to spell (all items themselves as well as all other tenses or forms of the item and all other important words) and the deletion of page numbers, guide words, pronunciation guides, and graphics. Most captions were deleted also; however, where information was included these were integrated into the text. In one case a description was written for information appearing in a graphic and this was inserted into the text.

Index items were selected (see Appendix B for criteria used) and listed (see Appendix B) so that the reader would have copy from which to record them.

Recorded encyclopedia selection. A 120-minute recording from The World Book Encyclopedia (Field Enterprises Educational Corporation, 1959a), an encyclopedia designed for use from grade five through adulthood, was made in the Talking Book Studios of APH. The entire recording was contained on one side of a 12-inch disc.

The recording contained 107 items of which 44 (41%) were indexed items (on the index track they were pronounced but not spelled). The first item on the recording was "Thousand and One Nights" and the last one was "Timbuktu." Of the total number of items, 46% offered no information but were referrals to other items.

The design of the record was identical to the one described for the recorded dictionary selection. As for the dictionary selection, a listing of the indexed items occurring in each part of the record appears in Appendix B. Criteria used in selecting these items are also reported in Appendix B.

Prior to the recording of the encyclopedia selection, the text material was edited. This was done to make the content identical to the braille edition. The task included the deletion of page numbers, column headings (guide words), initials of items' authors, graphics, and references to pictures. In most cases captions and legends were also deleted; however, where information was contained these were integrated into the text. When this occurred, where they were to be inserted was indicated and any rewriting required done. Where quotations appeared in the text, these were so noted by the insertion of the words "quote" and "close quote." The editing task also included making decisions as to which words should be spelled. All words other than common ones in the items themselves were spelled after being pronounced on the content channel. In general, other words that were spelled were proper names, foreign words, and all important words in the text that were not common enough to be readily recognized by younger users.

In addition to the editing task, items to be indexed were selected and listed so that the reader would have copy from which to record them.

Keys. Keys showing the indexed items occurring in each of the nine parts of the dictionary recording and the encyclopedia recording were necessary if users were to be able to locate items quickly. Such keys were provided in braille and large type (18-point by APH standards). Copy for them appears in Appendix B. These keys were the same as the listings of indexed items to which reference was made in the two preceding sections under Materials.

Written reference materials. Each experimenter needed a set of written reference materials paralleling the recorded materials to use with his subjects. These included a braille copy of the dictionary (Thorndike & Barnhart, 1959b), a large type copy of the dictionary (Thorndike & Barnhart, 1959c), a braille copy of the encyclopedia

(Field Enterprises Educational Corporation, 1959b), and a large type edition of the encyclopedia (Field Enterprises Educational Corporation, 1964).

In the case of the dictionary, the recorded, braille, and large type editions were all the same. However, for the encyclopedia, the large type edition was a later edition than the recorded and braille editions which were the same. Additionally, the large type edition was printed in 12-point type size (APH standards) rather than the standard 18-point size normally produced by APH. The reason this edition of the large type encyclopedia was used was because it was the only one available. Although the two editions, 1959 and 1964, were very similar in content, many items had been slightly rewritten in the later edition. Because of this, great care had to be taken in the selection of test and practice items so that they would be as nearly identical in the two editions as possible.

Procedure

Each subject was scheduled to work individually with one experimenter for five 40-minute periods during one school week. Generally, this was for one period on each of 5 consecutive days. The first 3 days were spent in training the subjects to use the materials and the last 2 days spent testing their use of them. The program for both training and testing is laid out specifically in the Subject Data Record which is described in Appendix C. Not only did this form detail the training and testing programs, but allowed for recording of data in all relevant stages of the processes.

During the first session the objectives of the study were described and subjects were given a brief review of the purposes, uses, and formats of reference materials. Following this they were taught to operate the Aural Study Systems using the dictionary recording as a medium. During the second session, the subjects were required to find two identical words on both the written and recorded forms of the dictionary. They were then required to find additional words on the recorded form. Accuracy of knowledge of spelling was assured by presenting the subjects with a written cue card for each item to be found. A similar procedure was used during the third session to give practice with the encyclopedia items.

Two sets of practice items were required--one set for dictionary items and one set for encyclopedia items. In each set, items to be located were equally divided between those most efficiently found by forward search and reverse search. No test item was included with the practice items. All practice items are listed in the Subject Data Record forms (see Appendix C).

During the fourth session subjects were required to locate and define eight dictionary items--four using the recorded edition, four using the written edition. These items were actually four pairs of adjacent items deliberately selected to insure that the tasks be of similar difficulty.

Criteria used for the selection of these items appear in Appendix D along with the test tasks. Separate times were kept for the time required to locate each item and the time required to report its definition. Responses were oral. On the Subject Data Record forms (see Appendix C) the experimenters noted the search technique used, the times required, and whether the response was correct or incorrect. A maximum time limit of 5 minutes was imposed for each task.

During the fifth session subjects were required to locate and answer direct questions about eight encyclopedia items--four using the recorded edition, four using the written edition. Actually, the same four items were used for both modes to insure that the tasks be of similar difficulty. However, different questions were asked about them. Criteria for the selection of these items appear in Appendix D along with the test tasks. Separate times were kept for the time required to locate each item and the time required to respond to the question about it. Responses were oral. On the Subject Data Record forms (see Appendix C) the experimenters noted the search technique used, the times required, and whether the response was correct or incorrect. A maximum time limit of 5 minutes was imposed for each task.

For both the dictionary and the encyclopedia, the four pairs of test tasks were numbered 1A, 1B, 2A, 2B, 3A, 3B, 4A, and 4B. In all cases the A and B tasks for a number were paired items (e.g., 1A and 1B were adjacent items in the dictionary and the same item in the encyclopedia). With dictionary items, the A item always immediately preceded the B item while, with the encyclopedia items, the information required to answer the B item always required slightly more of the text to be covered than for the A item. In no case was this difference greater than 13 words.

Test tasks were grouped in two sequences. This was done in order to counterbalance the media in which the tasks were performed (i.e., using recorded or written reference materials). The sequences were:

Sequence I		Sequence II
written	Task 1A	recorded
written	Task 2A	recorded
written	Task 3A	recorded
written	Task 4A	recorded
recorded	Task 1B	written
recorded	Task 2B	written
recorded	Task 3B	written
recorded	Task 4B	written

Subjects at each grade level of each reading type ($n = 2$) were assigned to either Sequence I or Sequence II by chance. A toss of

a coin determined the sequence to which the first in each group of two was assigned. The second was then automatically assigned to the otner sequence. Grade level and reading type differences that might have existed between the groups were controlled through the experimental design.

This procedure provided for the maximum possible separation between the two parallel tasks. It also promoted expediency as a subject would do all tasks using either medium consecutively rather than having to switch back and forth between tasks. However, it was possible that a practice effect might have occurred related to the ordinal position of the tasks.

Results

Data were analyzed by six separate mixed model analyses of variance in which total scores were used (i.e., the sum of each subject's four trials using each medium). Data for these were as follows:

1. dictionary--location times
2. dictionary--accuracy of locations
3. dictionary--accuracy of responses
4. encyclopedia--location times
5. encyclopedia--accuracy of locations
6. encyclopedia--accuracy of responses

Because the distribution of location times was skewed, it was necessary to do reciprocal transformations before analyzing these data. Between subjects variables in all six analyses were reading type (braille vs. large type), grade level (4-6, 7-9, 10-12), and order (A items written/B items recorded vs. A items recorded/B items written). In all analyses the within subject variable was medium (written reference material vs. recorded reference material).

Significant grade level differences were found, in the expected direction, in each of the six analyses. Subjects from higher grades consistently and progressively performed at higher levels than did subjects from lower grades.

Means and standard deviations for these and all other variables for which significant differences were found in the six analyses are reported in Tables 3 and 4 in Appendix E.

The data of most immediate importance to the goals of this project are reported in Tables 1 and 2. Table 1 gives the percentages of items correctly located within a 5-minute time limit and average location times with their ranges. Table 2 gives percentages of correct responses to questions about the items, average response times, and ranges of response

times for items correctly located within a 5-minute limit. Both tables contain data for the dictionary and encyclopedia in both written and recorded form.

Accuracy of location. Percentages correctly located ranged from 94% for the written dictionary items by large type readers to 78% for recorded dictionary and encyclopedia items by braille readers. Differences in accuracy of location between written and recorded material ranged from 2-9%. Only the media differences for the dictionary were significant beyond the 5% level. Large type students performed significantly better than braille students in use of the encyclopedia.

Accuracy of location for both types of references was quite consistent. Accuracy for large type readers was 94% for the written versions of the dictionary and encyclopedia, while corresponding figures for the recorded versions were 85% and 92%. Braille students showed even greater consistency. For the dictionary and encyclopedia accuracy in locating items in the written versions was 83% and 82% and for the recorded versions was 78%.

Time for item locations. Average times required to locate items ranged from a low of 37 seconds for written dictionary items by large type students to a high of 131 seconds for recorded dictionary items by braille students. Times required to find items in the recorded medium were consistently higher than those for the written medium. These differences were statistically significant at the 1% level of confidence. The extent to which location times for recorded materials exceeded those for written materials were 197% for the large type dictionary, 46% for the large type encyclopedia, 118% for the braille dictionary, and 40% for the braille encyclopedia. Ranges of times for each reference and medium were also determined. For the dictionary, ranges of location times for the written materials appear to exceed those for recorded materials over the entire range of scores. However, for the encyclopedia this does not appear to be the case in that scores in the upper range of the recorded distributions are lower than is the case for written materials.

Accuracy of responses. Once items were located, students were required to answer questions about them. Accuracy of responses ranged from 94% for written dictionary items for large type students to 68% for written encyclopedia items for braille students. However, no significant differences between the media for response accuracy was found for either type reference.

Response times. Times required to find answers to questions in all cases favored the recorded materials. These times ranged from an average of 11 seconds for recorded dictionary items for large type students to 44 seconds for written encyclopedia items for braille students. Inspections of ranges of response times reveals that those for recorded media are consistently narrower with spread of scores reduced most within the higher response times.

Table 1

Percentages of Items Correctly Located within a 5-Minute Time Limit and Average Location Times

	Percentage of Items Located Correctly	Range of Location Times (sec) per Item	Average Times (sec) Required per Item
Large Type Subjects			
Dictionary			
Written	94%	10-117	37
Recorded	85%	39-260	110
Encyclopedia			
Written	94%	10-259	59
Recorded	92%	37-219	86
Braille Subjects			
Dictionary			
Written	83%	10-220	60
Recorded	78%	48-265	131
Encyclopedia			
Written	82%	18-295	77
Recorded	78%	42-240	108

Table 2

Percentages of Correct Responses and Average Response Times

for Items Correctly Located within a 5-Minute Time Limit

	Percentage of Items Responded to Correctly	Range of Response Times (sec) per Item	Average Times (sec) Required per Item
Large Type Subjects			
Dictionary			
Written	94%	2-79	12
Recorded	85%	2-38	11
Encyclopedia			
Written	83%	5-162	35
Recorded	83%	15-132	33
Braille Subjects			
Dictionary			
Written	81%	3-69	20
Recorded	78%	4-22	10
Encyclopedia			
Written	68%	6-139	44
Recorded	72%	15-97	37

Additional Findings

Two additional findings of interest occur in the statistically significant interactions between grade level and medium for both the dictionary and encyclopedia for the location time data. The extent of these interactions is apparent in the approximate data appearing in Tables 3 and 4 in Appendix E. In both cases, the rate of decrease in location times as grade levels increase is greater for written materials than for recorded. This doubtlessly reflects differential experience with the media.

Discussion

As indicated in the introduction, the goal of this study was to determine if visually handicapped students could use recorded references successfully. To provide an ultimate standard, times for students to accomplish equivalent tasks with braille and large type materials were determined. However, it was not expected that results of the recorded medium would equal those for braille or large type because of the very great differences in experience favoring use of the latter medium.

As expected, location times for finding topics in both references were significantly shorter for the written medium. Location times for the recorded material ranged from 40-197% greater than those for the written materials. The longest mean recorded location time was 2 minutes, 11 seconds. The time of location differences in all likelihood reflect great differences in experience with the media. For this study, the total experience of the subjects with the recorded medium for reference materials was less than 4 hours. This is in contrast with a probable much greater experience with the materials in written form which were available to the students in their classrooms and school library. The import of greater experience favoring the written encyclopedia materials is documented by the significant medium X grade level interaction which shows the difference between media for location time to increase significantly with increase in grade level. This effect is less clearcut for the dictionary materials.

For accuracy of location, significant media differences were found favoring the print dictionary. However, even with the subjects limited experience in the use of recorded references, these differences were quite small ranging from only 2% to 9%. From the standpoint of practical use such differences lack meaning. The level of accuracy of location of items appears quite acceptable.

The results on accuracy of answers to questions about items when located generally failed to differentiate significantly among the media. Again under conditions of relatively short experience, the recorded medium appeared acceptable.

Times required to find answers to questions consistently favored the recorded medium for all materials. This probably reflects the greater communication rates attained through listening as compared to those attained through reading large type or braille.

From the standpoint of practical use, the data support development of recorded references for the visually handicapped. With the exception of times required to locate items, all criteria give evidence of their comparability in use to print materials. The item location time differences are believed to reflect differences in skill levels heavily dependent upon experience. It is strongly believed that equating experience would eliminate these differences. Even if this were not entirely the case, the material would still be of comparatively great practical value.

Other factors support the usefulness of recorded references. Any person having reading difficulty might benefit from their availability. In addition to braille and large type students, students who experience reading problems from such factors as dyslexia and mental retardation might benefit. Students who cannot handle books, such as the crippled and the cerebral palsied, with help, could use recorded materials. One set of references could serve a wide range of students with varying disabilities.

Two other very practical factors, required storage space and cost, appear to favor recorded references, at least for the visually handicapped. The following comparisons are based on estimates for publishing the 1973 World Book Encyclopedia in braille and recorded form.

Estimates are that the braille edition of the new encyclopedia would require 168 feet of shelf space to house it. In recorded form it could be contained on 580 flexible records which would require approximately 3 to 4 feet of shelf space. Additionally, a little space would be needed for storage of the player. Similar savings would be made for other reference works such as dictionaries.

There would be a decided price advantage to buying the recorded edition. Estimates are that the special player to be used with the Aural Study System could be sold for between $200 and $250 and a set of records containing the most recent edition of The World Book Encyclopedia for approximately $230 giving a total cost of $430-480. As a comparison, it is estimated that this same encyclopedia in braille would sell for between $925 and $950. In other words, a recorded edition of The World Book Encyclopedia, including the player on which to play it, would cost only about one-half as much as the same encyclopedia produced in braille. No estimate has been made of the cost of a large type edition of this encyclopedia which the same recorded edition would also replace.

Conclusions

Comparison of the efficiency of use of recorded references with the efficiency of use of their braille and large type counterparts showed few differences of practical significance. Other factors such as more generalized usefulness, lower cost, and vast reduction of required storage space strongly support the development of recorded references. Consequently, it is concluded that further development of the Aural Study System as a reference tool is justified.

References

Field Enterprises Educational Corporation. The world book encyclopedia. Vol. 16. T. Chicago: Author, 1959. (a)

Field Enterprises Educational Corporation. The world book encyclopedia. Vol. 129. Thousand and one nights--trade acceptance. (Braille ed.) Chicago: Author, 1959. [Published in braille through the generosity of the publisher and the Field Foundation by--Louisville, Ky.: American Printing House for the Blind, 1960-1961.] (b)

Field Enterprises Educational Corporation. The world book encyclopedia. Vol. 27. T. (Large type ed.) Chicago: Author, 1964.

Morris, J. E., Nolan, C. Y., & Brothers, R. J. Aural study systems for the visually handicapped: Field trial of the Aural Study System: Interim progress report no. 10. Louisville, Ky.: American Printing House for the Blind, 1973. [Project No. 8-0046; Grant No. OEG-0-8-080046-2670(032)]

Morris, J. E., Nolan, C. Y., & Phelps, B. G. Aural study systems for the visually handicapped: Description of the Aural Study System: Interim progress report no. 9. Louisville, Ky.: American Printing House for the Blind, 1973. [Project No. 8-0046; Grant No. OEG-0-8-080046-2670(032)]

Thorndike, E. L., & Barnhart, C. L. Thorndike-Barnhart junior dictionary. Chicago: Scott, Foresman, 1959. (a)

Thorndike, E. L., & Barnhart, C. L. Thorndike-Barnhart junior dictionary. Vol. 1. A--artless. (Braille ed.) Chicago: Scott, Foresman, 1959. [Embossed and printed by permission of the publisher by --Louisville, Ky.: American Printing House for the Blind, 1961.] (b)

Thorndike, E. L., & Barnhart, C. L. Thorndike-Barnhart junior dictionary. Vol. 2. A--bra. (Large type ed.) Chicago: Scott, Foresman, 1959. [Large type edition published by permission of the publisher by--Louisville, Ky.: American Printing House for the Blind, 1962.] (c)

Thorndike, E. L., & Lorge, I. The teacher's word book of 30,000 words. New York: Columbia University (Teachers College, Bureau of Publications), 1944.

APPENDIX A

ALPHABETICAL SCREENING TASK II

Alphabetical Screening Task II

As reference works are arranged alphabetically, it was essential that all subjects participating in the study both know the alphabet and know how to use it in determining the alphabetical position of words. In order to determine the latter, a screening device was constructed requiring the testee to mark the word in each of eight pairs of words that would occur first in an alphabetical listing. For the first two pairs of words, the critical letters involved the first letters occurring in the words; for the next two pairs, the second letters were the critical ones; for the next two pairs, the third letters; and for the last two pairs, the fourth letters were the critical ones. The right/left position of the words within each pair was determined by the toss of a coin.

Sixteen of the 26 letters in the alphabet were involved in the alphabetizing tasks. No letter was involved more than once and all vowels were included. The letters involved were well distributed throughout the alphabet. They were: a, c, d, e, h, i, l, n, o, p, s, t, u, v, w, and y.

All words included contained four to six letters. They were all common words reported by Thorndike and Lorge (1944) as occurring 100 or more times per million words, which was the authors' category for most frequently used words.

In order that the task not be confounded by a testee's spelling ability or knowledge of the spelling of braille contractions, all words in the braille version of the screening device were spelled out in grade one braille. Type size used in the large type version of the screening device was 18-point (APH standards). Copy for both the braille and large type versions is as follows.

Alphabetical Screening Task II--Braille Copy

American Printing House for the Blind

Reference Study

There are eight pairs of words that follow. Each word is spelled out fully in grade one braille. You are to mark the word in each pair that would come first in an alphabetical listing. Mark the word by drawing a line through it.

1.	clear	dear
2.	would	young
3.	blood	battle
4.	upon	until
5.	from	friend
6.	scene	school
7.	above	about
8.	loss	lost

Alphabetical Screening Task II--Large Type Copy

American Printing House for the Blind

Reference Study

There are eight pairs of words that follow. You are to mark the word in each pair that would come first in an alphabetical listing. Mark the word by drawing a line through it.

1.	clear	dear
2.	would	young
3.	blood	battle
4.	upon	until
5.	from	friend
6.	scene	school
7.	above	about
8.	loss	lost

APPENDIX B

ITEMS INDEXED ON THE RECORDS

Criteria Used in Selecting Items To Be Indexed

Dictionary

1. Indexing was to occur only at the beginning of items.
2. Items selected to be indexed were to be at approximately 150 word intervals.
3. Where indexing was to occur, and a set of similar items were listed sequentially (i.e., account, accountable, accountant, and accounting), the first one listed was to be the indexed one.

Encyclopedia

1. Indexing was to occur only at the beginning of items.
2. Items selected to be indexed were to be at approximately 250 word intervals; however, this varied widely due to the difference in length of the descriptions of items.
3. Where indexing was to occur for an item listed more than once (i.e., thrush meaning a group of songbirds and thrush meaning a contagious disease), the first one listed was to be the indexed one.

Indexed Items for the Dictionary

Part 1

a
abandon
abate
abdicate
abed
abide

Part 2

able
aboard
aboriginal
above
abreast

Part 3

abrupt
absolute
abstain
absurd
abut

Part 4

Acadia
accept
access
accident
accommodate

Part 5

accompaniment
accord
account
accouter

Part 6

accumulate
accustom
ache
acknowledge
acorn

Part 7

acquire
acrid
act
active
acute

Part 8

Adam
add
addle
adequacy
adj.

Part 9

adjunct
administer
admirable
admit
ado

Indexed Items for the Encyclopedia

Part 1

Thousand and One Nights
Thrace
Thrasher
Three-Dimensional Picture
Threshing Machine

Part 2

Thrift
Thrip
Thrombosis

Part 3

Thrust
Thug
Thulium
Thunder
Thurber, James Grover
Thuringian Forest
Thutmose, III

Part 4

Thwart
Thymol
Thyroid Gland
Thyroxine
Tibbu

Part 5

Tiber River
Tibet
Tibia

Part 6

Tick
Tickbird
Ticker
Tidal Air

Part 7

Tide
Tie (1st)
Tientsin
Tierce (1st)

Part 8

Tietjens, Eunice Hammond
Tiffany, Charles Lewis
Tiger
Tiger Cat
Tiglath-Pileser

Part 9

Tigris River
Tilburg
Tile
Tilefish
Till
Tillstrom, Burr
Timarau
Timbrel

APPENDIX C

SUBJECT DATA RECORD

REFERENCE STUDY--SUBJECT DATA RECORD

Name _____ Sex _____

School _____ Grade _____

Week of _____ Schedule _____

Reading Medium _____ Data Collector _____

Has subject ever used a dictionary?

Has subject ever used an encyclopedia?

Comments

Day One

Day Two

Day Three

Day Four

Day Five

General Observations

REFERENCE STUDY--DAILY STARTING SETUP

All equipment and materials should be placed on a table providing ample space.

Two chairs--one for the subject and one for the experimenter

As strong a lamp or lighting as possible in testing environment

Orientation of directions--the user

The player should be setup ready for use

Plugged into an electrical outlet

Lid off and placed behind the player

Speaker plugged into speaker jack on top deck of player

Tone arm swung all the way to the right

Turntable speed control set at 8-1/3 rpm

Appropriate record

Day 1--off turntable and on the table to the right of the player

Days 2, 3, 4, and 5--on the turntable, right side up

Appropriate key

Day 1--none used; therefore, none present

Days 2, 3, 4, and 5--on the table to the right of the player

Power/volume control--in off position (full counterclockwise)

Tone control--set midway between treble and bass

Variable speed control

Pushed in; therefore, not engaged

Rotated midway between fastest and slowest

Pause control--released

Foot control--not present

Headphones--not present

Appropriate written reference material

Day 1--none used; therefore, none present

Days 2, 3, 4, and 5--on the table to the right of the player (under the key)

Day One

Say to the subject:

DURING THIS WEEK YOU ARE GOING TO LEARN HOW TO USE A SPECIAL RECORD PLAYER TO FIND ITEMS IN A RECORDED DICTIONARY AND IN A RECORDED ENCYCLOPEDIA. BY THE END OF THE WEEK YOU WILL BE ABLE TO LOCATE SUCH ITEMS WITHOUT HELP FROM ME AND ANSWER QUESTIONS ABOUT THEM.

Day One

Review of Reference Materials

Dictionary

Definition. A dictionary is a book in which the words of a language are listed alphabetically. Definitions and pronunciations are given for the words along with other information.

History. The first dictionary was written more than 2,500 years ago when the Assyrians wrote a dictionary of their language. The first attempt to catalog all the common words of the English language was a dictionary published by Nathan Bailey in 1721. Since that time a number of dictionaries have been compiled. Some of these have been revised and enlarged many times.

Types of dictionaries.

English language
Foreign language
Lexicon--as of an ancient language
Historical

Uses of an English language dictionary. (Ask the subject the purposes for which he has used a dictionary. Then discuss those listed below. Those marked with an asterisk are included in the Thorndike-Barnhart Junior Dictionary. Other uses listed are possible with other dictionaries; however, not necessarily all of them with all other dictionaries. Bring to the subject's attention all uses marked with an asterisk. Use judgment, in accordance with the subject's grade level, as to which, if any, of the others to mention.)

* Meaning of words
  Various meanings listed under separate numbers
  Proper use shown by examples from recognized writers
* Correct spelling
* Correct pronunciation (syllables, accent marks, diacritics)
* Syllables--showing where a word may be divided at the end of a line
* Part of speech
* Other forms of the word
* Abbreviations
* Prefixes and suffixes

Etymologies--derivation of the word from other words
Synonyms--exact meaning of synonyms may be given
Reference to other words with related meaning
Comparison with other related words
Antonyms--words with opposite meanings
Americanizations
Slang meanings
If the word is obsolete
Whether a verb is transitive or intransitive--transitive verbs take direct objects, intransitive ones do not (e.g., He disapproves.)

Day One

Encyclopedia

Definition. An encyclopedia is quite different from a dictionary. The dictionary gives the spelling of a word, its meaning, its pronunciation, and similar information about the word. The encyclopedia takes up the subject for which the word stands. It tells in detail such things as: why it is important in our lives, what it looks like, how it works, and what its history has been. Communication is a word which the dictionary defines in a brief paragraph. But an encyclopedia gives many pages of words to an article on communication. The article describes the various forms of communication such as the telephone, the telegraph, and the radio, and tells how they developed from earlier forms of communication.

An encyclopedia is a reference work that presents a selected collection of facts covering all fields of human knowledge. All the worthwhile things that man has ever known or done from the dawn of civilization to the present day may be found in the pages of an encyclopedia. The basic aims of the modern encyclopedia are:

1. To present the important facts about man, the world he lives in, the things he has done, and the ideas he has developed.
2. To present these facts without bias or personal opinion, in language that is easy to understand.

History. Aristotle, who lived from 384-322 B. C., is known as the "Father of Encyclopedists" as he made one of the first attempts to gather all the knowledge of his time into a series of books. In Aristotle's time it was much easier to compile an encyclopedia than it is today because not so much was known about the world. Today, so much is known that only the important facts can be selected for a general encyclopedia. Good encyclopedias of today have to undergo continuous revision and expansion to keep up with the rapidly growing fields of human knowledge.

Format. Encyclopedias are handy reference works in which information on all or many branches of knowledge may be found. This information is given in articles which are alphabetically arranged so that they may be found easily. Cross references are found with some entries. These tell where more information about the subject may be found.

Uses. (Ask the subject to tell you the kind of thing for which he has used an encyclopedia. Continue with a general discussion of the kind of things a student might use an encyclopedia for; such as, making reports for history and science, getting information needed for writing papers in English, learning more about things about which he is personally interested, etc.)

Day One

Activities to Familiarize Subjects with
Record Player and Record

NOTE: Desired terminal behaviors have been underlined.

I. Familiarization to the record player

"The subject should be able to . . ."

A. List verbally the five features that are located on the top deck.

1. Examine the top deck and name the features or controls with which you are already familiar.
2. Discuss location of the turntable, turntable speed control, record guides (stops), speaker jack, and tone arm.
3. Discuss the shape of each feature and its position relative to sides of the top deck.
4. Name the five features discussed in A-2.

B. List verbally the five controls that are located on the front panel. Note also the headphone jack.

1. Discuss the location of the power-volume control, the tone control, the variable speed control, the pause control, and the fast forward/fast reverse control. Note also the location of the headphone jack.
2. Discuss the shape of each control and its position relative to the other controls and reference points of the panel.
3. Name the six features discussed in B-1.

C. Describe each control in respect to its shape and its operation.

1. What is the shape of the volume, tone, and variable speed controls?
2. What is the shape of the pause and the fast forward/fast reverse controls?
3. Activate each control especially noting the movements required for the round controls and the toggle type switches.
4. Demonstrate the range possible using the variable speed control and that normal speed is obtained by merely pushing it in.
5. Especially note the power to the machine is activated through the power-volume control.

Day One

6. Describe stops for turntable speed control in terms of clock face positions and practice manipulations.

7. Touch any feature or control of the player upon command.

II. Familiarization to the Dictionary Record

"The instructor should tell the subject . . ."

A. The record is divided into nine parts

1. Subject should examine record tactually--some will be able to feel the blank bands.

2. Differentiate between the terms "bands" and "parts"

B. The record is cut stereophonically--two tracks within a groove

1. Regular track containing content

2. Index track containing cue words

C. The two tracks are played at different speeds

1. Regular track--8-1/3 rpm

2. Index track--66-2/3 rpm

D. To place the record on the turntable of the player

III. Familiarization to the indexing capabilities of the system

"The subject should be able to . . ."

A. Verbally specify the special features and movement characteristics of the tone arm. (i.e., horizontal movement of the arm; record edge finder and button to activate it, lip with which to move tone arm, the lever on top which, when depressed retracts the stylus assembly [making horizontal movement possible] and activates the photoelectric scanning device.)

B. Demonstrate how each feature of the tone arm is used.

1. Use record edge finder to place the needle at the beginning of the record.

2. Activate the photoelectric scanning device by a light pressure on the lip of the lever at the top of the tone arm.

a. Move the arm horizontally across the record noting the auditory cues provided.

b. Relate these cues to the bands on the record.

3. Count the audible signals as the tone arm is moved across the record.

4. Differentiate between the edge of the record and the actual beginning of Part One.

5. Differentiate between the audible cue heard for a band and the audible cue heard from the area near the center of the record.

6. Practice finding bands and setting needle down on them. (practice until done successfully three consecutive times)

C. Demonstrate how the index track is searched

1. Search forward into a part using fast forward

a. Listen to two indexed items

b. Switch to regular track and listen to second

2. Reverse to start of part--note sound of index cues in reverse

3. Discuss alphabetical format

4. Find the end of a part

a. Reverse into part and stop at second sound heard

b. Switch to fast forward to learn what item is

c. Switch to regular track and listen to it

IV. Practice

A. Use two indexing capabilities of the system in a coordinated manner (e.g., find second indexed item in Part 4).

B. Use variable speed control

1. Listen to item (IV-A) at the normal rate

2. Listen to item (IV-A) again this time at fast rate

C. Use pause control

1. After IV-B-1

2. After IV-B-2

D. Other practice items

Day Two

Dictionary Practice Items

[Note to examiner: The correct direction of search is determined by the item's position on the key--items occurring in the first half of a part would be most efficiently found through forward search; those occurring in the last half of a part would be most efficiently found through reverse search.]

Review key.

Turn on record player's power.

1. Find the letter A on the record. [Give cue card.]
   (Part 1, 1st indexed item--forward search)

   Use key

   Verbalize search technique

   Locate

   Listen to item

   Find the letter A in the written edition.
   (Braille page 1; large type page 61)

   [Give instructions if necessary]

   Read item

   Relate the two

2. Find the word ado on the record. [Give cue card.]
   (Part 9, last [5th] indexed item--reverse search)

   Use key

   Verbalize search technique

   Locate

   Listen to item

   Find the word ado in the written edition.
   (Braille page 55; large type page 98)

   [Give instructions if necessary]

   Read item

   Relate the two

Day Two

[Remove written edition--it will not be used subsequently during practice]

3. Find the word accident. [Give cue card.]
(Part 4, 2nd from last [4th] indexed item--reverse search)

    Use key
    Verbalize search technique
    Locate
    Listen--note two meanings

4. Find the word acrid. [Give cue card.]
(Part 7, 2nd indexed item--forward search)

    Use key
    Verbalize search technique
    Locate
    Listen--note two meanings

5. Find the word abracadabra. [Give cue card.]
(Part 2, 2nd item after 2nd from last [4th] indexed item--reverse search)

    Use key
    Verbalize search technique
    Locate
    Listen--note two meanings

6. Find the word adder. [Give cue card.]
(Part 8, 2nd item after 2nd indexed item--forward search)

    Use key
    Verbalize search technique
    Locate
    Listen--note two meanings

7. Find the word acolyte. [Give cue card.]
(Part 6, 3rd item after 2nd from last [4th] indexed item--reverse search)

    Use key
    Verbalize search technique
    Locate
    Listen--note two meanings

8. Find the word absolve. [Give cue card.]
(Part 3, 3rd item after 2nd indexed item--forward search)

    Use key
    Verbalize search technique
    Locate
    Listen--note two meanings

Day Two

9. Find the word accrue. [Give cue card.]
(Part 5, 5th item after last [4th] indexed item [last item in part]--reverse search)

Use key
Verbalize search technique
Locate
Listen--note only one meaning

10. Find the word accede. [Give cue card.]
(Part 4, 1st item after 1st indexed item--forward search)

Use key
Verbalize search technique
Locate
Listen--note two meanings

11. Find the word abhor. [Give cue card.]
(Part 1, 5th item after 2nd from last [5th] indexed item--reverse search)

Use key
Verbalize search technique
Locate
Listen--note only one meaning

12. Find the word adjust. [Give cue card.]
(Part 9, 3rd item after 1st indexed item--forward search)

Use key
Verbalize search technique
Locate
Listen--note only one meaning

Day Three

Encyclopedia Practice Items

[Note to examiner: The correct direction of search is determined by the item's position on the key--items occurring in the first half of a part would be most efficiently found through forward search; those occurring in the last half of a part would be most efficiently found through reverse search.]

Review key.

Turn on record player's power.

1. Find the item Thousand and One Nights on the record. [Give cue card.]
(Part 1, 1st indexed item--forward search)

Use key

Verbalize search technique

Locate

Listen to item--cross reference

Find the item Thousand and One Nights in the written edition.
(Braille page 773; 12-point page 207)

[Give instructions if necessary]

Read item

Relate the two editions

2. Find the item Timbrel on the record. [Give cue card.]
(Part 9, last [8th] indexed item--reverse search)

Use key

Verbalize search technique

Locate

Listen to item

Find the item Timbrel in the written edition.
(Braille page 837; 12-point page 225)

[Give instructions if necessary]

Read item

Relate the two

Day Three

[Remove written edition--it will not be used subsequently during practice.]

3. Find the item Tibet. [Give cue card.]
(Part 5, 2nd indexed item--forward search)

    Use key
    Verbalize search technique
    Locate
    Do not listen--item is very long

4. Find the item Ticker. [Give cue card.]
(Part 6, 2nd from last [3rd] indexed item--reverse search)

    Use key
    Verbalize search technique
    Locate
    Listen--cross reference

5. Find the item Tiflis. [Give cue card.]
(Part 8, 2nd item after 2nd indexed item--forward search)

    Use key
    Verbalize search technique
    Locate
    Listen to only a line or two

6. Find the item Throttle. [Give cue card.]
(Part 2, first item after last [3rd] indexed item--reverse search)

    Use key
    Verbalize search technique
    Locate
    Listen--cross reference

7. Find the item Thursday. [Give cue card.]
(Part 3, 1st item after 2nd to last [6th] indexed item--reverse search)

    Use key
    Verbalize search technique
    Locate
    Listen to only a line or two

8. Find the item Thyme. [Give cue card.]
(Part 4, 1st item after 1st indexed item--forward search)

    Use key
    Verbalize search technique
    Locate
    Listen to only a line or two

Day Three

9. Find the item Three-Mile Limit. [Give cue card.]
(Part 1, 1st item after 2nd to last [4th] indexed item--reverse search)

Use key
Verbalize search technique
Locate
Listen to item

10. Find the item Thule. [Give cue card.]
(Part 3, 1st item after 2nd indexed item--forward search)

Use key
Verbalize search technique
Locate
Listen to item--cross reference

11. Find the item Tiberias. [Give cue card.]
(Part 4, 1st item after last [5th] indexed item--reverse search)

Use key
Verbalize search technique
Locate
Listen to item--cross reference

12. Find the item Tilden, William Tatem, Jr. [Give cue card.]
(Part 9, 2nd item after 2nd indexed item--forward search)

Use key
Verbalize search technique
Locate
Listen to item--date and cross reference

Day Four

Dictionary Test

Sequence _____

[Start timing as soon as task is stated and cue card is given to the subject. When using written edition, stop timing when subject starts to respond. When using recorded edition, stop timing when the subject engages the pause. Evaluate response on content. If response is vague, probe. Maximum time permitted per task--5 minutes.]

Say to the subject: I AM GOING TO ASK YOU TO LOOK UP SOME WORDS IN THE (WRITTEN) (RECORDED) EDITION OF THE DICTIONARY. TELL ME AS SOON AS YOU HAVE FOUND THE WORD. For subject's using the written edition, say: AS SOON AS YOU HAVE READ THE DEFINITION AND CAN REPEAT IT TO ME, STOP READING AND TELL ME WHAT THE WORD MEANS. For subject's using the recorded edition, say: AS SOON AS YOU HAVE HEARD THE DEFINITION AND CAN REPEAT IT TO ME, STOP THE PLAYER AND TELL ME WHAT THE WORD MEANS.

1A. Written/Recorded Find the word abysmal and tell me what it means.
[Give cue card.]

Written: Braille page 19; large type page 73
Recorded: Part 3, 1st item after 5th indexed item--reverse search

Search technique used _____

Time to locate _____

Total time _____

Response _____

[too deep to be measured; bottomless]

2A. Written/Recorded Find the word aboard and tell me what it means.
[Give cue card.]

Written: Braille page 8; large type page 66
Recorded: Part 2, 2nd indexed item--forward search

Search technique used _____

Time to locate _____

Total time _____

Response _____

[on board; on a ship, train, airplane, etc.]

Day Four

3A. Written/Recorded Find the word accurate and tell me what it means.
[Give cue card.]

Written: Braille page 31; large type pages 82 and 83 [answer on 82]
Recorded: Part 6, 3rd item after 1st indexed item--forward search

Search technique used _____

Time to locate _____

Total time _____

Response _____

[precisely correct; exactly right
as the result of care or pains]

4A. Written/Recorded Find the word adjoin and tell me what it means.
[Give cue card.]

Written: Braille page 50; large type pages 94 and 95 [answer on 94]
Recorded: Part 8, 3rd item after 5th indexed item--reverse search

Search technique used _____

Time to locate _____

Total time _____

Response _____

[be next to; be close to; be side by side]

Day Four

Say to the subject: NOW, I AM GOING TO ASK YOU TO LOOK UP SOME WORDS IN THE (WRITTEN) (RECORDED) EDITION OF THE DICTIONARY. TELL ME WHEN YOU HAVE FOUND THE WORD. For subject's using the written edition, say: AS SOON AS YOU HAVE READ THE DEFINITION AND CAN REPEAT IT TO ME, STOP READING AND TELL ME WHAT THE WORD MEANS. For subject's using the recorded edition, say: AS SOON AS YOU HAVE HEARD THE DEFINITION AND CAN REPEAT IT TO ME, STOP THE PLAYER AND TELL ME WHAT THE WORD MEANS.

1B. Written/Recorded Find the word abyss and tell me what it means.
[Give cue card.]

Written: Braille page 19; large type page 73
Recorded: Part 3, 2nd item after 5th indexed item--reverse search

Search technique used _____

Time to locate _____

Total time _____

Response _____

[A bottomless depth; a very deep crack in the earth]

2B. Written/Recorded Find the word abode and tell me its first meaning.
[Give cue card.]

Written: Braille page 8; large type page 66
Recorded: Part 2, 1st item after 2nd indexed item--forward search

Search technique used _____

Time to locate _____

Total time _____

Response _____

[place to live in; dwelling; house]

Day Four

3B. Written/Recorded Find the word accursed and tell me its first meaning.
[Give cue card.]

Written: Braille page 31; large type page 83
Recorded: Part 6, 4th item after 1st indexed item--forward search

Search technique used _____

Time to locate _____

Total time _____

Response _____

[under a curse]

4B. Written/Recorded Find the word adjourn and tell me its first meaning.
[Give cue card.]

Written: Braille page 50; large type page 95
Recorded: Part 8, 4th item after 5th indexed item--reverse search

Search technique used _____

Time to locate _____

Total time _____

Response _____

[put off until a later time]

IF I ASKED YOU TO LOOK UP SOME MORE WORDS, IN WHICH EDITION OF THE DICTIONARY WOULD YOU PREFER TO DO IT? _____

WHY?

Day Five

Encyclopedia Test

Sequence _____

[Two separate times will be required for each of these tasks; one being the time required to locate the item and the other being the time to answer the question about it. Timing for the location part of each task will start immediately after the subject is told the item he is to locate and given the cue card. For subject's using the written edition, timing will stop when the subject says he has located the item. For subject's using the recorded edition, timing will stop when the subject engages the pause. Timing for the second part of each task, answering the question, will start as soon as the question is stated. Timing will stop when the subject starts to respond. Maximum combined time for two tasks--5 minutes.]

Say to the subject: TODAY, I AM GOING TO ASK YOU TO LOOK UP SOME ITEMS IN THE (WRITTEN) (RECORDED) EDITION OF THE ENCYCLOPEDIA. For subject's using the written edition, say: TELL ME AS SOON AS YOU HAVE FOUND THE ITEM. THEN, I WILL ASK YOU A QUESTION ABOUT IT. YOU WILL HAVE TO READ THE ARTICLE TO FIND THE ANSWER. HOWEVER, YOU MAY NOT HAVE TO READ THE WHOLE ARTICLE ABOUT THE ITEM. STOP READING AS SOON AS YOU HAVE FOUND THE ANSWER TO THE QUESTION AND TELL ME. For subject's using the recorded edition, say: AS SOON AS YOU HAVE FOUND THE ITEM, STOP THE RECORD PLAYER. THEN, I WILL ASK YOU A QUESTION ABOUT IT. YOU WILL HAVE TO LISTEN TO THE ARTICLE TO FIND THE ANSWER. HOWEVER, YOU MAY NOT HAVE TO LISTEN TO THE WHOLE ARTICLE ABOUT THE ITEM. STOP THE PLAYER AS SOON AS YOU HAVE FOUND THE ANSWER AND TELL ME.

1A. Written/Recorded Look up the item thymol. [Give cue card.]

Written: Braille page 795; 12-point page 212
Recorded: Part 4, 2nd indexed item--forward search

Search technique used _____

Time to locate _____

Question: What more powerful antiseptic is thymol sometimes used to replace?

Time to respond _____

Response _____

[iodoform]

Day Five

2A. Written/Recorded Look up the item Tilden, Samuel Jones. [Give cue card.]

Written: Braille pages 831-832 [answer on 831]; 12-point page 223
Recorded: Part 9, 1st item after 2nd indexed item--forward search

Search technique used _____

Time to locate _____

Question: Samuel Tilden became famous as a leader of an attack on the "Tweed Ring" of New York City. Through what kind of schemes had this ring stolen millions of dollars?

Time to respond _____

Response _____

[city improvement]

3A. Written/Recorded Look up the item tiger lily. [Give cue card.]

Written: Braille pages 828-829 [answer on 828]; 12-point page 223
Recorded: Part 8, 1st item after 4th indexed item--reverse search

Search technique used _____

Time to locate _____

Question: How tall does the tiger lily's stem often grow?

Time to respond _____

Response _____

[5 or 6 feet]

4A. Written/Recorded Look up the item Tientsin [Give cue card.]

Written: Braille pages 820-821 [answer on 820]; 12-point page 221
Recorded: Part 7, 3rd indexed item (2nd from end of part)--reverse search

Search technique used _____

Time to locate _____

Question: Tientsin is how many miles southeast of Peiping?

Time to respond _____

Response _____

Day Five

Say to the subject: NOW, I AM GOING TO ASK YOU TO LOOK UP SOME ITEMS IN THE (WRITTEN) (RECORDED) EDITION OF THE ENCYCLOPEDIA. For subject's using the written edition, say: TELL ME AS SOON AS YOU HAVE FOUND THE ITEM. THEN, I WILL ASK YOU A QUESTION ABOUT IT. YOU WILL HAVE TO READ THE ARTICLE TO FIND THE ANSWER. HOWEVER, YOU MAY NOT HAVE TO READ THE WHOLE ARTICLE ABOUT THE ITEM. STOP READING AS SOON AS YOU HAVE FOUND THE ANSWER TO THE QUESTION AND TELL ME. For subject's using the recorded edition, say: AS SOON AS YOU HAVE FOUND THE ITEM, STOP THE RECORD PLAYER. THEN, I WILL ASK YOU A QUESTION ABOUT IT. YOU WILL HAVE TO LISTEN TO THE ARTICLE TO FIND THE ANSWER. HOWEVER, YOU MAY NOT HAVE TO LISTEN TO THE WHOLE ARTICLE ABOUT THE ITEM. STOP THE PLAYER AS SOON AS YOU HAVE FOUND THE ANSWER AND TELL ME.

1B. Written/Recorded Look up the item thymol. [Give cue card.]

Written: Braille page 795; 12-point page 212
Recorded: Part 4, 2nd indexed item--forward search

Search technique used _____

Time to locate _____

Question: Thymol cannot be relied on to do what?

Time to respond _____

Response _____

[kill all germs]

2B. Written/Recorded Look up the item Tilden, Samuel Jones. [Give cue card,]

Written: Braille pages 831-832 [answer on 831]; 12-point page 223
Recorded: Part 9, 1st item after 2nd indexed item--forward search

Search technique used _____

Time to locate _____

Question: Where was Samuel Tilden born?

Time to respond _____

Response _____

[New Lebanon, New York]

Day Five

3B. Written/Recorded Look up the item tiger lily. [Give cue card.]

Written: Braille pages 828-829 [answer on 828]; 12-point page 223
Recorded: Part 8, 1st item after 4th indexed item--reverse search

Search technique used _____

Time to locate _____

Question: What shape are the tiger lily's leaves?

Time to respond _____

Response _____

[lance-shaped]

4B. Written/Recorded Look up the item Tientsin. [Give cue card.]

Written: Braille pages 820-821 [answer on 820]; 12-point page 221
Recorded: Part 7, 3rd indexed item (2nd from end of part)--reverse search

Search technique used _____

Time to locate _____

Question: Tientsin is near the mouth of what river?

Time to respond _____

Response _____

[Hai]

IF I ASKED YOU TO LOOK UP SOME MORE ITEMS, IN WHICH EDITION OF THE ENCYCLOPEDIA WOULD YOU PREFER TO DO IT? _____

WHY?

APPENDIX D

TEST TASKS

Criteria Used in Selecting Test Items

Dictionary

1. Pairs of items comprised of adjacent items of similar length. Common words were avoided.
2. Pairs of items having distinct meaning (dissimilar items) were selected.
3. Words selected had definitions clearly stated in a few words.
4. Pairs of items were selected coming from different parts of the recording meaning they were distributed throughout the text.
5. In the recorded edition, an equal number of pairs were selected that would be most efficiently found through forward and reverse search.
6. One member from the first four pairs (1/8 = 12-1/2%) was an indexed item to reflect the 15% of the total number of items that were indexed.

Encyclopedia

1. Items selected were ones for which two questions could be asked where answers to the questions were specifically stated in the text in a few words.
2. Items selected were ones where answers to the two questions for the item required a similar amount of the text to be covered.
3. Items selected were those not containing many foreign nor difficult words.
4. Items selected were ones for which the overall length was not too long.
5. Items were selected coming from different parts of the record meaning they were distributed throughout the text. No item was selected from Part 2 of the record as that part was primarily devoted to the topic "thrift."
6. In the recorded edition, an equal number of items were selected that would be most efficiently found through forward and reverse search.
7. Two of the items selected were indexed items (2/4 = 50%) to reflect the 41% of the total which are indexed items.
8. Items selected were those similarly written-up in the braille (1959) and 12-point print (1964) editions.

Dictionary--Test Items

(adjacent pairs of words)

Item	Time to Locate	Position	Task	Correct R
1A. abysmal	58" (r)	Part 3, 1st item after 5th indexed item	define	too deep to bottomless
1B. abyss	39" (r)		define	a bottomless deep crack
2A. aboard	29" (f)	Part 2, second indexed item	define	on board; on airplane, et
2B. abode (1st)	37" (f)		define	place to liv
3A. accurate	22" (f)	Part 6, 3rd item after 1st indexed item	define	precisely co as the resul
3B. accursed (1st)	36" (f)		define	under a curs
4A. adjoin	40" (r)	Part 8, 3rd item after 5th indexed item	define	be next to; be side by s
4B. adjourn (1st)	47" (r)		define	put off unti

f indicates search was forward from beginning of part
r indicates search was reverse from end of part

NOTE: In dictionary practice it was necessary to explain that a word may have sever meanings (i.e., first meaning).

Dictionary--Test Items

(adjacent pairs of words)

Time to Locate	Position	Task	Correct Response
58" (r)	Part 3, 1st item after 5th indexed item	define	too deep to be measured; bottomless
39" (r)		define	a bottomless depth; a very deep crack in the earth
29" (f)	Part 2, second indexed item	define	on board; on a ship, train, airplane, etc.
37" (f)		define	place to live in; dwelling; house
22" (f)	Part 6, 3rd item after 1st indexed item	define	precisely correct; exactly right as the result of care or pains
36" (f)		define	under a curse
40" (r)	Part 8, 3rd item after 5th indexed item	define	be next to; be close to; be side by side
47" (r)		define	put off until a later time

f indicates search was forward from beginning of part
r indicates search was reverse from end of part

onary practice it was necessary to explain that a word may have several
(i.e., first meaning).

Pages Where Information To Do Tasks Is Found

Task	Braille Page	Large Type Page
1A	19	73
1B	19	73
2A	8	66
2B	8	66
3A	31	82-83 [answer on 82]
3B	31	83
4A	50	94-95 [answer on 94]
4B	50	95

Encyclopedia--Test Items

THYMOL--write-up very similar in two editions

Record: Part 4, 2nd indexed item [23" (f) to locate]
Braille page 795
12-point page 212

1A. What more powerful antiseptic is thymol sometimes used to replace?

answer: iodoform
49 words to answer--braille and 12-point editions

1B. Thymol cannot be relied on to do what?

answer: kill all germs
62 words to answer--braille and 12-point editions

TILDEN, SAMUEL JONES--partially rewritten in latter edition; however, similar through where answers to questions are found--total length of braille edition's item is 173 words; total length of 12-point edition's item is 202 words plus a picture with a 2 word captian

Record: Part 9, 1st item after 2nd indexed item [35" (f) to locate]
Braille pages 831-832 [answer on 831]
12-point page 223

2A. Samuel Tilden became famous as a leader of an attack on the "Tweed Ring" of New York City. Through what kind of schemes had this ring stolen millions of dollars?

answer: city improvement
46 words to answer in braille edition
41 words to answer in 12-point edition

2B. Where was Samuel Tilden born?

answer: New Lebanon, New York
54 words to answer in braille edition
53 words to answer in 12-point edition

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f indicates search was forward from beginning of part
r indicates search was reverse from end of part

NOTE: Instructions to the subjects should tell them to stop reading or listening as soon as they have found the information to answer the question.

TIGER LILY--write-up very similar in two editions

Record: Part 8, 1st item after 4th indexed item [59" (r) to locate]
Braille pages 828-829 [answer on 828]
12-point page 223

3A. How tall does the tiger lily's stem often grow?

answer: 5 or 6 feet
79 words to answer in braille edition
83 words to answer in 12-point edition

3B. What shape are the tiger lily's leaves?

answer: lance-shaped
83 words to answer in braille edition
86 words to answer in 12-point edition

TIENTSIN--write-up very similar in two editions

Record: Part 7, 3rd indexed item (2nd from end of part) [40" (r) to locate]
Braille pages 820-821 [answer on 820]
12-point page 221

4A. Tientsin is how many miles southeast of Peiping?

answer: 85
49 words to answer in braille edition
53 words to answer in 12-point edition

4B. Tientsin is near the mouth of what river?

answer: Hai
57 words to answer in braille edition
61 words to answer in 12-point edition

APPENDIX E

RESULT. OF ANALYSES OF VARIANCE

Table 3

Means and Standard Deviations for All Variables Differing Significantly at the .05 and .01 Levels in Dictionary Use

	Total Location Times (sec)		Accuracy of Locations		Accuracy of Responses	
	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ
Reading Type (RT)						
Braille	537.6	348.4	-	-	-	-
Large Type	382.3	262.3	-	-	-	-
Grade Level (GL)						
4-6	675.0	331.7	2.7	1.3	2.6	1.3
7-9	417.6	284.0	3.6	0.6	3.6	0.8
10-12	287.2	190.5	3.9	0.3	3.9	0.3
Medium (M)						
Written	304.1	313.1	3.6	1.0	-	-
Recorded	615.8	233.7	3.2	1.0	-	-
RT X M						
Br./Wr.	401.2	375.5	-	-	-	-
Br./Rec.	674.0	263.6	-	-	-	-
LT/Wr.	207.1	202.2	-	-	-	-
LT/Rec.	557.5	189.1	-	-	-	-
GL X M						
4-6/Wr.	536.3	376.7	-	-	-	-
4-6/Rec.	813.7	215.0	-	-	-	-
7-9/Wr.	237.9	247.0	-	-	-	-
7-9/Rec.	597.3	192.9	-	-	-	-
10-12/Wr.	138.2	123.9	-	-	-	-
10-12/Rec.	436.2	110.0	-	-	-	-

Note.--These data are for the combined or total score for the four tasks performed by each subject using each medium. The maximum time permitted for the four location tasks was 1,200 seconds while the maximum number of locations and responses possible were four.

Table 4

Means and Standard Deviations for All Variables Differing Significantly at the .05 and .01 Levels in Encyclopedia Use

	Location Times (sec)		Accuracy of Locations		Accuracy of Responses	
	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ
Reading Type (RT)						
Braille	534.8	323.3	3.2	1.2	-	-
Large Type	352.0	242.8	3.7	0.8	-	-
Grade Level (GL)						
4-6	648.6	354.5	2.8	1.5	2.1	1.5
7-9	410.4	240.0	3.6	0.8	3.3	1.0
10-12	271.2	125.0	4.0	0.2	3.8	0.5
Medium (M)						
Written	378.8	333.0	-	-	-	-
Recorded	508.0	247.4	-	-	-	-
RT X Order (O)						
Br./W-R	-	-	2.7	1.5	2.4	1.6
Br./R-W	-	-	3.7	0.6	3.2	1.2
LT/W-R	-	-	3.9	0.2	3.6	0.7
LT/R-W	-	-	3.5	1.2	3.1	1.4
GL X M						
4-6/Wr.	602.5	421.7	-	-	-	-
4-6/Rec.	694.8	283.4	-	-	-	-
7-9/Wr.	352.6	267.5	-	-	-	-
7-9/Rec.	468.2	203.9	-	-	-	-
10-12/Wr.	181.3	74.6	-	-	-	-
10-12/Rec.	361.1	97.4	-	-	-	-

Table 4-Continued

	Location Times (sec)		Accuracy of Locations		Accuracy of Responses	
	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ
RT X GL X O						
Br./4-6/W-R	-	-	1.2	1.0	0.8	1.0
Br./4-6/R-W	-	-	3.5	0.8	2.7	1.5
LT/4-6/W-R	-	-	3.8	0.4	3.3	0.8
LT/4-6/R-W	-	-	2.7	1.8	1.7	1.6
Br./7-9/W-R	-	-	3.0	1.3	2.7	1.5
Br./7-9/R-W	-	-	3.5	0.5	3.0	1.1
LT/7-9/W-R	-	-	4.0	0.0	3.8	0.4
LT/7-9/R-W	-	-	4.0	0.0	3.7	0.5
Br./10-12/W-R	-	-	4.0	0.0	3.7	0.5
Br./10-12/R-W	-	-	4.0	0.0	4.0	0.0
LT/10-12/W-R	-	-	4.0	0.0	3.7	0.8
LT/10-12/R-W	-	-	3.8	0.4	3.8	0.4

Note.--These data are for the combined or total score for the four tasks performed by each subject using each medium. The maximum time permitted for the four location tasks was 1,200 seconds while the maximum number of locations and responses possible were four.